We claim

1. A sweeping linear magnetron comprising

a cathode backing plate, said cathode backing plate having an exterior surface adapted to be attached to a vacuum chamber wherein a plasma deposition process will occur;

a drive housing attached to said exterior surface of said cathode backing plate, said drive housing positioned over a cut-out in the surface of said cathode backing plate;

a motor held in said drive housing, said motor driving a yoke, said yoke positioned within said cut-out in said surface of said cathode backing plate;

a magnet pack, said magnet pack attached to said yoke, said magnet pack having a first magnet mounting plate and a second magnet mounting plate that goes over the first magnet mounting plate and a plurality of magnets positioned between said first magnet mounting plate and said second magnet mounting plate, said magnet pack having between the first magnet mounting plate and the second magnet mounting plate one or more center magnets having a first end and a second end and a body between said first end and said second end and one or more side magnets having a first end and a second end and a body between said first end and said second end, the bodies of said center magnets and said side magnets generally positioned in the same alignment so that their ends do not contact each other and one or more end magnets one the magnet mounting plates in an area of the magnet mounting plates that extends past the ends of the center and side magnet; and

said magnet pack being moved over a target material, said target material being sputtered within said vacuum chamber onto a substrate.

2. The magnetron according to claim 1 wherein the magnet mounting plates have at least one side edge and at least one end edge, and said side magnets are positioned along said side edge and said end magnets are positioned along said end edge.

3. The magnetron according to claim 2 wherein one or more filler magnets are positioned between the body of the center magnets and the body of the side magnets.

4. The magnetron according to claim 2 wherein one or more end magnets extend from one end of one side magnet to one end of a second side magnet.

5. The magnetron according to claim 4 wherein one or more end magnets form an arc that extends from one end of one side magnet to one end of a second side magnet along the end edge of said magnet mounting plates.

6. The magnetron according to claim 4 wherein the end magnets act as a shunt for the magnetic flux.

7. The magnetron according to claim 6 wherein the end magnets are fixed to the magnet mounting plate with their south poles facing said target material.

8. The magnetron according to claim 7 wherein the side magnets have their north poles facing said target material.

9. The magnetron according to claim 8 wherein the center magnets have their south poles facing said target material.

10. The magnetron according to claim 9 wherein said filler magnets may be oriented such that their north poles contact the side magnets, while their south poles contact the center magnets.

11. The magnetron according to claim 1 wherein said magnet pack moves linearly across a width of said target material.

12. The magnetron according to claim 1 wherein said magnet pack moves linearly across a length of said target material.

13. The magnetron according to claim 1 wherein said motor is a frequency actuator.

14. The magnetron according to claim 1 wherein said motor is an air cylinder.

15. The magnetron according to claim 1 wherein a plurality of cooling fins are disposed on said first magnet mounting plate.

16. The magnetron according to claim 10 wherein a plurality of cooling fins is disposed on each of said magnet mounting plates.

17. An improved magnetron comprising

a cathode backing plate, said cathode backing plate attaching to a vacuum chamber wherein a plasma deposition process can occur;

a magnet pack positioned within a cut-out in said cathode backing plate, said

magnet pack adapted to move within said cut-out;

a means to move said magnet pack within said cut-out; and

a target material, said target material being on a side of said cathode backing plate in said vacuum chamber, said magnet pack moving over said target material to alter a magnetic field created by said magnet pack.

18. A magnet pack for use in a plasma deposition process comprising

a first magnet mounting plate;

a second magnet mounting plate that goes over the first magnet mounting plate; and

a plurality of magnets positioned between said first magnet mounting plate and said second magnet mounting plate, said magnet pack having between the first magnet mounting plate and the second magnet mounting plate one or more center magnets having a first end and a second end and a body between said first end and said second end and one or more side magnets having a first end and a second end and a body between said first end and said second end, the bodies of said center magnets and said side magnets generally positioned in the same alignment so that their ends do not contact each other and one or more end magnets one the magnet mounting plates in an area of the magnet mounting plates that extends past the ends of the center and side magnet.

19. A target material uniformly eroded by a device, said device comprising

a cathode backing plate, said cathode backing plate having an exterior surface adapted to be attached to a vacuum chamber wherein a plasma deposition process will

occur;

a drive housing attached to said exterior surface of said cathode backing plate, said drive housing positioned over a cut-out in the surface of said cathode backing plate;

a motor held in said drive housing, said motor driving a yoke, said yoke positioned within said cut-out in said surface of said cathode backing plate;

a magnet pack, said magnet pack attached to said yoke, said magnet pack having a first magnet mounting plate and a second magnet mounting plate that goes over the first magnet mounting plate and a plurality of magnets positioned between said first magnet mounting plate and said second magnet mounting plate, said magnet pack having between the first magnet mounting plate and the second magnet mounting plate one or more center magnets having a first end and a second end and a body between said first end and said second end and one or more side magnets having a first end and a second end and a body between said first end and said second end, the bodies of said center magnets and said side magnets generally positioned in the same alignment so that their ends do not contact each other and one or more end magnets one the magnet mounting plates in an area of the magnet mounting plates that extends past the ends of the center and side magnet; and

said magnet pack being moved over a target material, said target material being sputtered within said vacuum chamber onto a substrate.

20. A sweeping linear magnetron for providing full-face target erosion resulting in non-reactive mode film uniformity, said magnetron comprising

a cathode backing plate, said cathode backing plate having an exterior surface

adapted to be attached to a vacuum chamber wherein a plasma deposition process will occur;

a drive housing attached to said exterior surface of said cathode backing plate, said drive housing positioned over a cut-out in the surface of said cathode backing plate;

a motor held in said drive housing, said motor driving a yoke, said yoke positioned within said cut-out in said surface of said cathode backing plate;

a magnet pack, said magnet pack attached to said yoke, said magnet pack having a first magnet mounting plate and a second magnet mounting plate that goes over the first magnet mounting plate and a plurality of magnets positioned between said first magnet mounting plate and said second magnet mounting plate, said magnet pack having between the first magnet mounting plate and the second magnet mounting plate one or more center magnets having a first end and a second end and a body between said first end and said second end and one or more side magnets having a first end and a second end and a body between said first end and said second end, the bodies of said center magnets and said side magnets generally positioned in the same alignment so that their ends do not contact each other and one or more end magnets one the magnet mounting plates in an area of the magnet mounting plates that extends past the ends of the center and side magnet; and

said magnet pack being moved over a target material, said target material being sputtered within said vacuum chamber onto a substrate.

21. The magnetron according to claim 20 wherein said non-reactive mode film uniformity is about +/- 3-5% over a 12" by 12" area with a constant rate and uniformity enduring for a lifetime of said target material.

22. The magnetron according to claim 21 further comprising a reactive mode, said reactive mode resulting in minimal target poisoning.

23. A sweeping linear magnetron for arc-fee, highly uniform deposition of a dielectric film with a high deposition rate resulting in a minimal target poisoning, said magnetron comprising

a cathode backing plate, said cathode backing plate having an exterior surface adapted to be attached to a vacuum chamber wherein a plasma deposition process will occur;

a drive housing attached to said exterior surface of said cathode backing plate, said drive housing positioned over a cut-out in the surface of said cathode backing plate;

a motor held in said drive housing, said motor driving a yoke, said yoke positioned within said cut-out in said surface of said cathode backing plate;

a magnet pack, said magnet pack attached to said yoke, said magnet pack having a first magnet mounting plate and a second magnet mounting plate that goes over the first magnet mounting plate and a plurality of magnets positioned between said first magnet mounting plate and said second magnet mounting plate, said magnet pack having between the first magnet mounting plate and the second magnet mounting plate one or more center magnets having a first end and a second end and a body between said first end and said second end and one or more side magnets having a first end and a second end and a body between said first end and said second end, the bodies of said center magnets and said side magnets generally positioned in the same alignment so that their ends do not contact each other and one or more end magnets one the magnet mounting plates in an area of the magnet mounting plates that extends past the ends of the center and side magnet; and

said magnet pack being moved over a target material, said target material being sputtered within said vacuum chamber onto a substrate.

24. The magnetron according to claim 213wherein said target material comprises aluminum or other non-magnetic metal.

25. The magnetron according to claim 23 wherein said target material comprises nickel or other magnetic metal.

26. The magnetron according to claim 23 wherein said target material comprises gold or other precious metal.

27. The magnetron according to claim 23 wherein said target material comprises boron- or phosphorus-doped silicon or other semiconductor.

28. The magnetron according to claim 23 wherein said target material is comprised of a conductive material that can be reactively sputtered with oxygen or nitrogen to form insulating films.

29. The magnetron according to claim 23 wherein said target material comprises indium-tin oxide or other transparent conducting oxide.

30. The magnetron according to claim 23 wherein said dielectric film is selected from the group consisting of aluminum oxide, aluminum nitride, silicon dioxide, silicon nitride, titanium oxide, titanium nitride, tantalum oxide and tantalum nitride.

31. A sweeping linear magnetron for improved step coverage of a dielectric film deposited by DC reactive sputtering comprising

a cathode backing plate, said cathode backing plate having an exterior surface adapted to be attached to a vacuum chamber wherein a plasma deposition process will occur;

a drive housing attached to said exterior surface of said cathode backing plate, said drive housing positioned over a cut-out in the surface of said cathode backing plate;

a motor held in said drive housing, said motor driving a yoke, said yoke positioned within said cut-out in said surface of said cathode backing plate;

a magnet pack, said magnet pack attached to said yoke, said magnet pack having a first magnet mounting plate and a second magnet mounting plate that goes over the first magnet mounting plate and a plurality of magnets positioned between said first magnet mounting plate and said second magnet mounting plate, said magnet pack having between the first magnet mounting plate and the second magnet mounting plate one or more center magnets having a first end and a second end and a body between said first end and said second end and one or more side magnets having a first end and a second end and a body between said first end and said second end, the bodies of said center magnets and said side magnets generally positioned in the same alignment so that their ends do not contact each other and one or more end magnets one the magnet mounting plates in an area of the magnet mounting plates that extends past the ends of the center and side magnet; and

said magnet pack being moved over a target material, said target material being sputtered within said vacuum chamber onto a substrate.

32. A film formed by a sweeping linear magnetron said magnetron comprising

a cathode backing plate, said cathode backing plate having an exterior surface adapted to be attached to a vacuum chamber wherein a plasma deposition process will occur;

a drive housing attached to said exterior surface of said cathode backing plate, said drive housing positioned over a cut-out in the surface of said cathode backing plate;

a motor held in said drive housing, said motor driving a yoke, said yoke positioned within said cut-out in said surface of said cathode backing plate;

a magnet pack, said magnet pack attached to said yoke, said magnet pack having a first magnet mounting plate and a second magnet mounting plate that goes over the first magnet mounting plate and a plurality of magnets positioned between said first magnet mounting plate and said second magnet mounting plate, said magnet pack having between the first magnet mounting plate and the second magnet mounting plate one or more center magnets having a first end and a second end and a body between said first end and said second end and one or more side magnets having a first end and a second end and a body between said first end and said second end, the bodies of said center magnets and said side magnets generally positioned in the same alignment so that their ends do not contact each other and one or more end magnets one the magnet mounting plates in an area of the magnet mounting plates that extends past the ends of the center and side magnet; and

said magnet pack being moved over a target material, said target material being sputtered within said vacuum chamber onto a substrate.